

Notice of Allowability

Application No.

10/619,731

Examiner

Rakesh K. Dhingra

Applicant(s)

RENKEN, WAYNE GLENN

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to RCE dated 05/19/06.
2. ☒ The allowed claim(s) is/are 1,3-15,18-22 and 26-35.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Peter Gallagher on 07/19/06, 07/20/06. The application has been amended as follows:

In the Claims

Amendment to the Claims

The claims and their status are reflected below. Claims 1, 3-15, 18-22 and 26-35 are pending in the application.

1. (Previously presented) A system for varying the temperature of a wafer comprising:

a first temperature controlled plate, the first temperature controlled plate comprising first proximity pins, the first proximity pins configured to distance the wafer from the first temperature controlled plate;

a second temperature controlled plate comprising second proximity pins, the wafer located between the first and second temperature controlled plates, a distance from the second temperature controlled plate to the wafer established by the first and second proximity pins; and

an enclosure surrounding the first and second temperature controlled plates and the wafer, the enclosure comprising a gas input and output, the gas flowing from the input past the wafer and to the output.

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2. (Canceled)

3. (Previously presented) The system of claim 1 wherein the second proximity pins are moveable such that the distance between the first and second temperature controlled plates may be varied.

4. (Original) The system of claim 1 further comprising a flow distribution manifold configured to distribute the gas upon the wafer.

5. (Previously presented) The system of claim 4 wherein the flow distribution manifold comprises a plurality of laminar flow paths, each of the plurality of laminar flow paths comprising one laminar flow element controlling the flow rate of said flow path, the laminar flow element providing gas to one gas passage that leads to the exterior of the flow distribution manifold.

6. (Previously presented) The system of claim 5 wherein the laminar flow element comprises a horizontal channel formed in a surface of a substrate and the gas passage extends to an opposing surface of the substrate.

7. (Previously presented) The system of claim 5 wherein each of the plurality of laminar flow paths further comprise a cavity such that any contaminants or solvents that may be present in the enclosure and that may enter the flow paths will accumulate in the cavity rather than in the laminar flow elements.

8. (Original) The system of claim 4 wherein the flow distribution manifold is in contact with the first temperature controlled plate, and wherein the gas distributed is at substantially the same temperature as the first temperature controlled plate.

9. (Original) The system of claim 8 wherein the first temperature control plate comprises flow channels and wherein the gas flows from the manifold and through the channels to the wafer.

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10. (Original) The system of claim 1 further comprising a gas output flow regulator.

11. (Currently amended) A device for controlling the temperature of a wafer comprising:

a first temperature control element comprising first proximity pins for supporting the wafer;

a second temperature control element comprising second proximity pins and spaced from the first temperature control element by the second proximity pins;

a gas distribution system configured to distribute gas at different points about a surface of the wafer, the gas distribution system comprising a plurality of flow paths, each of the plurality of flow paths comprising a laminar flow element, the laminar flow paths formed as channels in a surface of a plate that is in thermal contact with the second temperature control element, an individual laminar flow path extending along a plane that is parallel to the plane of the wafer;

an enclosure surrounding the first and second temperature control elements, the gas distribution system and the wafer; and

wherein the wafer is located between the gas distribution system and the first temperature control element.

12. (Original) The device of claim 11 wherein the gas distribution system is temperature controlled thereby providing substantially uniform temperature distribution and gas flow distribution across the surface of the wafer.

13. (Original) The device of claim 11 further comprising an exhaust system configured to regulate the exhaust flow rate of the gas.

14. (Original) The device of claim 11 wherein the gas distribution system comprises one or more heating and cooling elements.

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15. (Previously presented) The device of claim 12 wherein the gas distribution system and the first temperature control element can be adjusted to different temperatures in order to vary the temperature gradient within the device.

16-17 (Canceled)

18. (Currently amended) A post exposure bake chamber comprising:
a first heating plate comprising first proximity pins;
a second heating plate comprising second proximity pins;
the first and second heating plates configured to heat a wafer placed between the plates, the wafer spaced from the first heating plate by first proximity pins, the second heating plate spaced from the first heating plate by second proximity pins when the second heating plate is in a closed position, the second heating plate being more distant from the first heating plate when in an open position; and
an enclosure that surrounds the first heating plate and the second heating plate.

19. (Original) The post exposure bake chamber of claim 18 further comprising a flow control system having distributed gas flow paths and one or more flow control elements regulating the gas flow rate through the gas flow paths.

20. (Original) The post exposure bake chamber of claim 19 wherein the flow control system is in contact with the first heating plate such that the gas is heated by the first heating plate.

21. (Original) The post exposure bake chamber of claim 19 wherein the gas passes from the flow control system through passages in the first heating plate to the wafer.

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22. (Original) The post exposure bake chamber of claim 19 wherein the flow control system comprises a flow channel plate, the one or more flow control elements formed in the flow channel plate.

23-25 (Canceled)

26. (currently amended) A system for varying the temperature of a wafer comprising:

an upper temperature altering device;

a lower temperature altering device with a first plurality of proximity pins for supporting the wafer, the wafer located between the upper and lower temperature altering devices;

a second plurality of proximity pins on the upper temperature altering device that determine the spacing between the upper temperature altering device and the lower temperature altering device; and

an enclosure surrounding the upper and lower temperature altering devices and the wafer, the enclosure comprising a gas input and output, the gas flowing from the input past the wafer and to the output, the system varying a rate of movement of the upper temperature altering device or the rate of closure of the enclosure to adjust the temperature of the wafer.

27. (Original) The system of claim 26 wherein the system is further operable to vary a rate of change of the temperature of the wafer by adjusting the rate of closure.

28. (Original) The system of claim 26 wherein the enclosure comprises an upper portion and a lower portion, and wherein the system is operable to vary a rate of closure of the upper or lower portion.

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29. (currently amended) A device for controlling the temperature of a wafer within an enclosure having a first and second enclosing structures, the device comprising:

a first temperature control element comprising first proximity pins; and
a second temperature control element comprising second proximity pins; and

a gas distribution system configured to distribute gas at different points about a surface of the wafer, the gas distribution system comprising a plurality of flow paths, and a laminar flow element,

wherein the wafer is located between the gas distribution system and the first temperature control element, the wafer spaced from the first temperature control element by the first set of proximity pins, the second temperature control element spaced from the first temperature control element by the second set of proximity pins; and

wherein the enclosure encloses the first and second temperature control elements and the gas distribution system, and the device adjusts the rate of opening and closure of the enclosure by varying one or more rates of movement of the first or second enclosing structures.

30. (currently amended) An apparatus that controls the temperature of a wafer, comprising:

a lower temperature controlled plate comprising first proximity pins and disposed below the wafer;

a gas distribution system extending above the wafer to deliver gas at a plurality of locations across a surface of the wafer; and

an upper temperature controlled plate above the wafer and comprising a plurality of second proximity pins extending from its lower surface, the upper temperature controlled plate being movable with respect to the lower temperature controlled plate; and

an enclosure surrounding the lower temperature controlled plate, the gas distribution system and the upper temperature controlled plate.

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31. (Previously presented) The apparatus of claim 30 wherein the wafer is displaced from an upper surface of the lower temperature controlled plate by lower pins extending from the lower temperature controlled plate.

32. (currently amended) The apparatus of claim 30 wherein a lower limit of movement of the upper temperature controlled plate is established by the upper pins extending from the upper temperature controlled plate, the upper pins contacting the lower temperature controlled plate when the lower limit is reached.

33. (Previously presented) The apparatus of claim 30 wherein the upper and lower temperature controlled plates are resistively heated plates.

34. (Previously presented) The apparatus of claim 30 wherein the upper and lower temperature controlled plates are chill plates.

35. (Previously presented) The apparatus of claim 30 wherein the speed of movement of the upper temperature controlled plate is controlled to achieve a desired temperature profile.

REASONS FOR ALLOWANCE

The following is an examiner's statement of reasons for allowance:

Regarding independent Claims 1, 11, 18, 26, 29 and 30: Closest prior art (US Patent No. 6,097,005, Akimoto et al) teaches a first temperature controlling plate with first proximity pins and a second temperature controlling plate, but does not teach second proximity pins on the second temperature controlled plate where a distance from the second

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temperature controlled plate to the wafer is established by the first and second proximity pins, and also does not teach an enclosure surrounding the first and second temperature controlled plates and the wafer.

Claims 1, 3-15, 18-22, 26-35 allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance." Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

Conclusion

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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